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(71) Applicant
Sun Microsystems Inc

(Incorporated in the USA - Delaware)

2550 Garcia Avenue, Mountain View, California 94043, United States of America

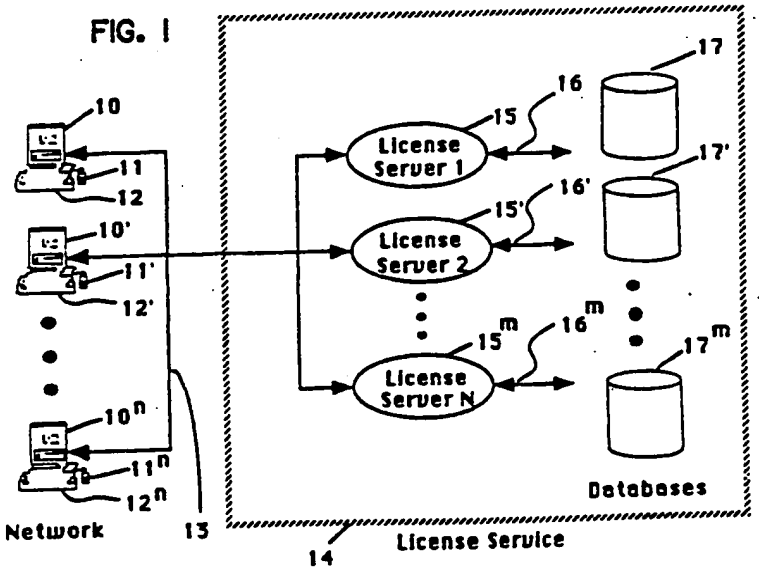
(72) Inventor
John Richard Corbin

(74) Agent and/or Address for Service
Potts Kerr and Co
15 Hamilton Square, Birkenhead, Merseyside, L41 6BR, United Kingdom

(54) Protecting against the unauthorised use of software in a computer network

(57) The present invention provides to a software application the verification and licence check out functions which are normally performed by a licence server. The encrypted licence information is contained in a licence token, and is stored in a database 17 controlled by the licence server 15. In contrast to the prior art where the server either grants or denies the request after verifying the user's credentials, the server in the preferred embodiment of the present invention finds the correct licence token for the software application and transmits the token to a licencing library. A licence access module attached to the application decodes the token. Routines in the licencing library coupled to the software application verify th licence information before issuing the licence and updating the token. The access module then encodes the updated tok n before returning it to the server. Because the verification and issuing function of a token are performed by a software application, the application rather than the server becomes the point of attack by unauthorised users. Reverse engine ring the access module is less rewarding than attacking the server because the module reveals the contents of a small fraction of a database of licences.

FIG. 1



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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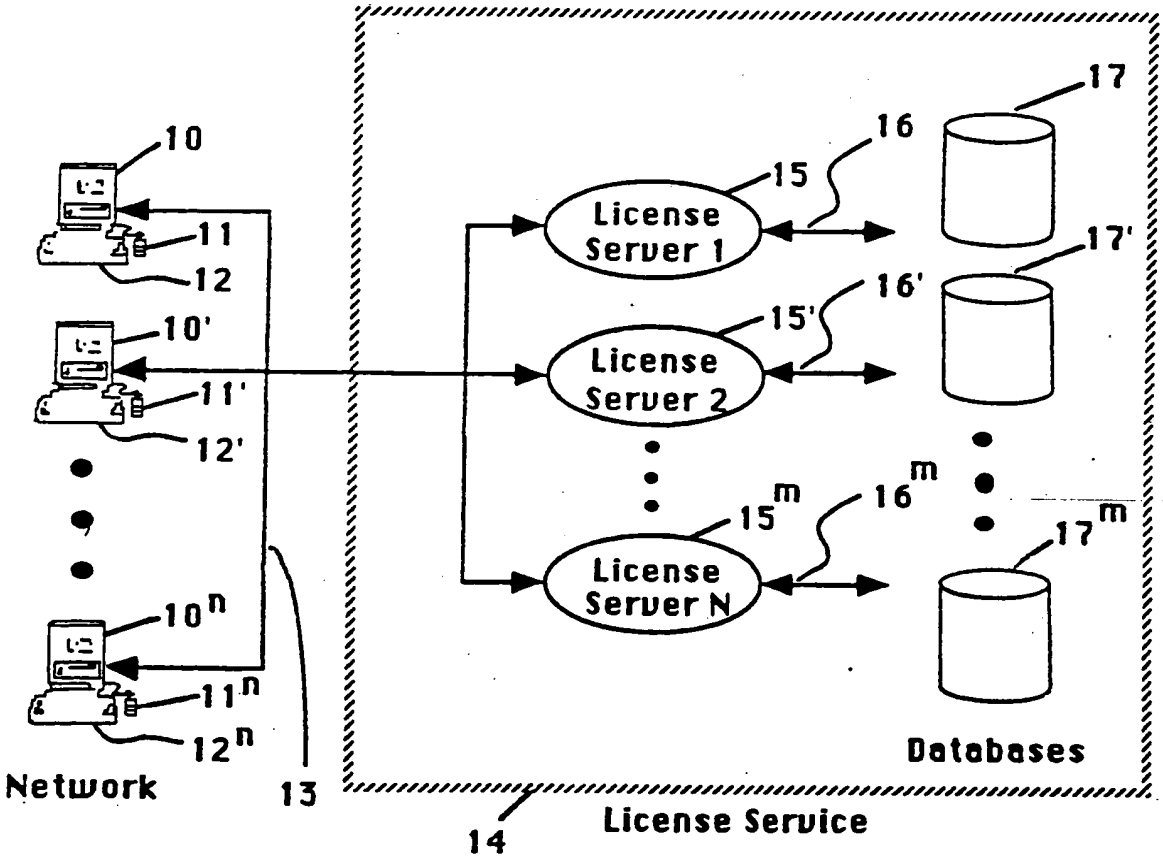
10
11
12
10'
11'
12'
10^n
11^n
12^n
Network
13
License Server 1
License Server 2
License Server N
15
16
17
15'
16'
17'
15^m
16^m
17^m
Databases
14
License Service

FIG. 1

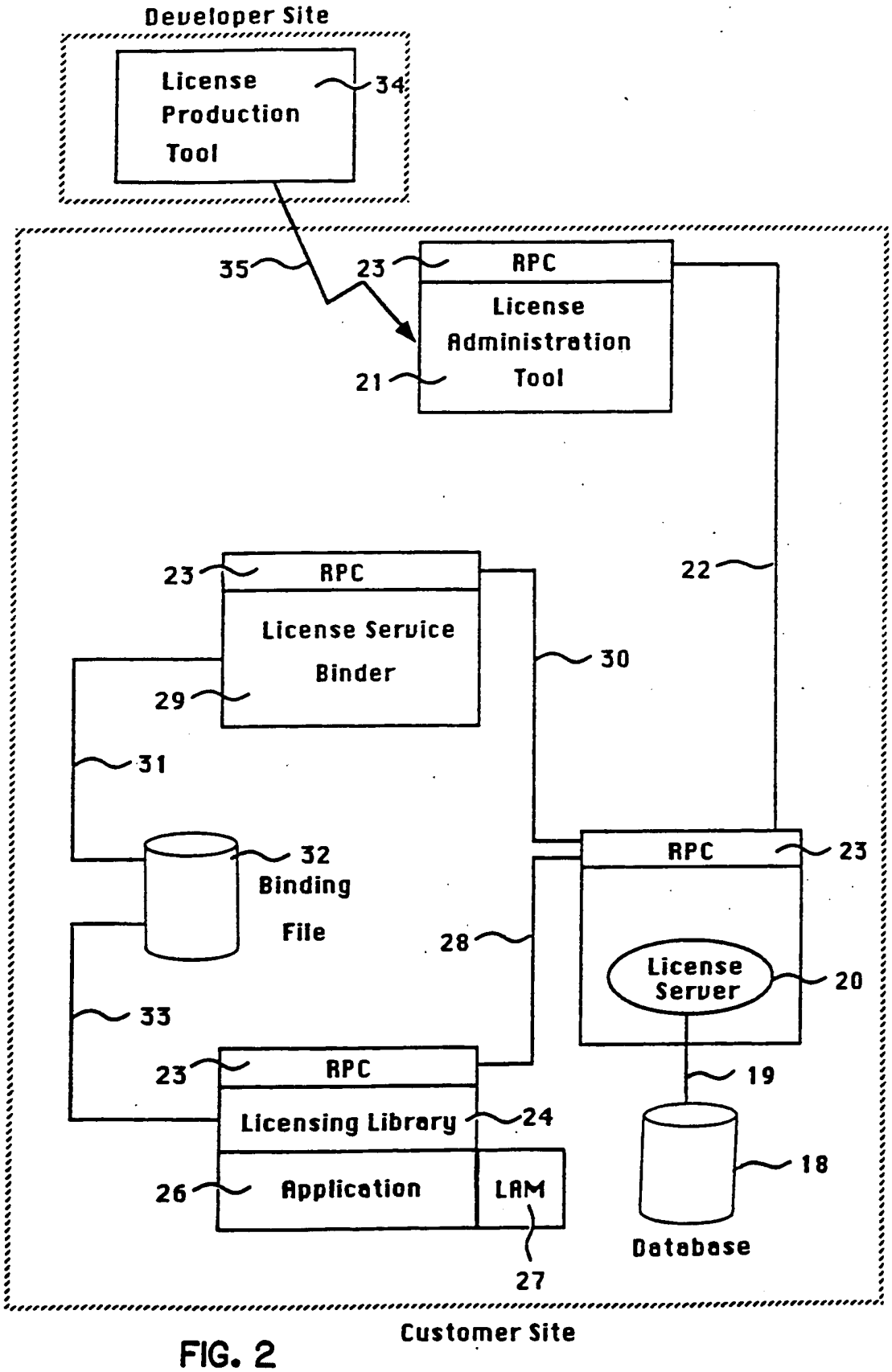
Developer Site
License Production Tool
34
35
23
RPC
License Administration Tool
21
22
23
RPC
License Service Binder
29
30
31
32
Binding File
RPC
23
28
License Server
20
33
23
RPC
19
Licensing Library
24
18
26
Application
LAM
27
Database
Customer Site

FIG. 2

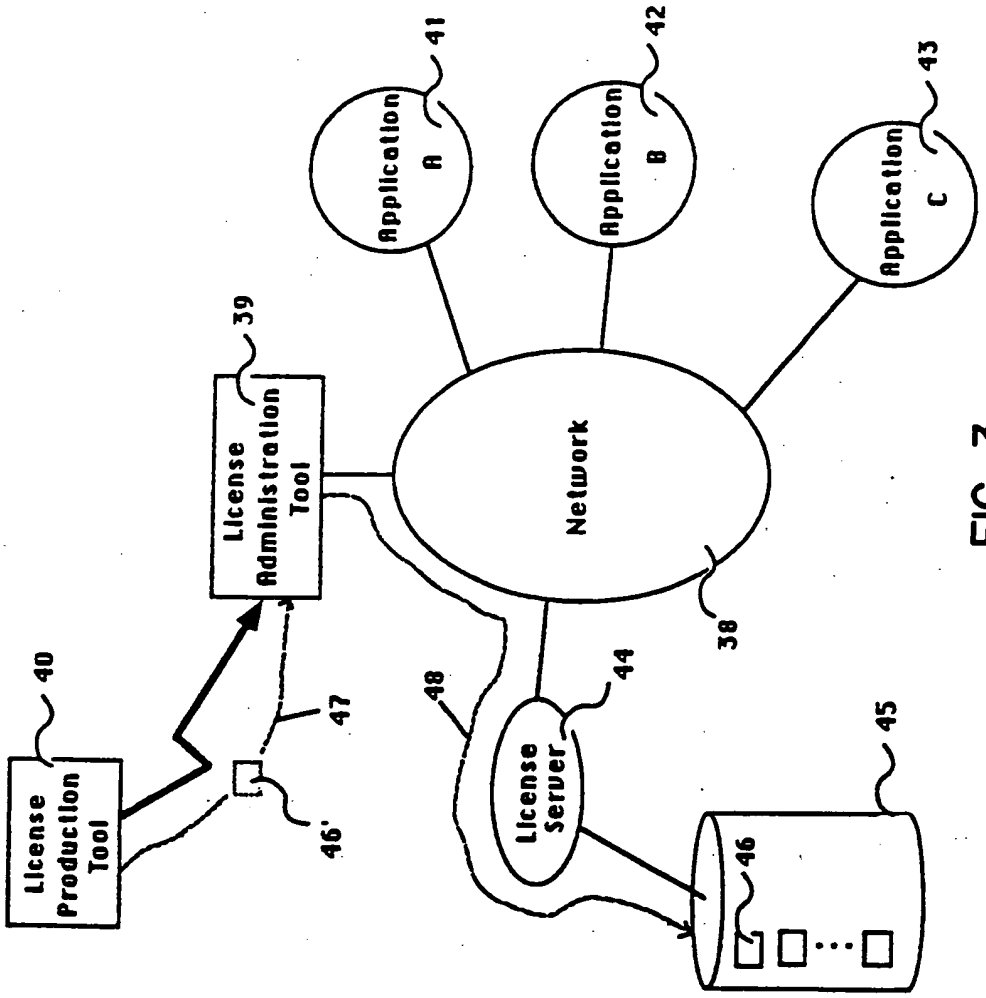
License Production Tool
40
License Administration Tool
39
Application A
41
Application B
42
Application C
43
Network
38
License Server
44
45
46
46'
47
48

FIG. 3

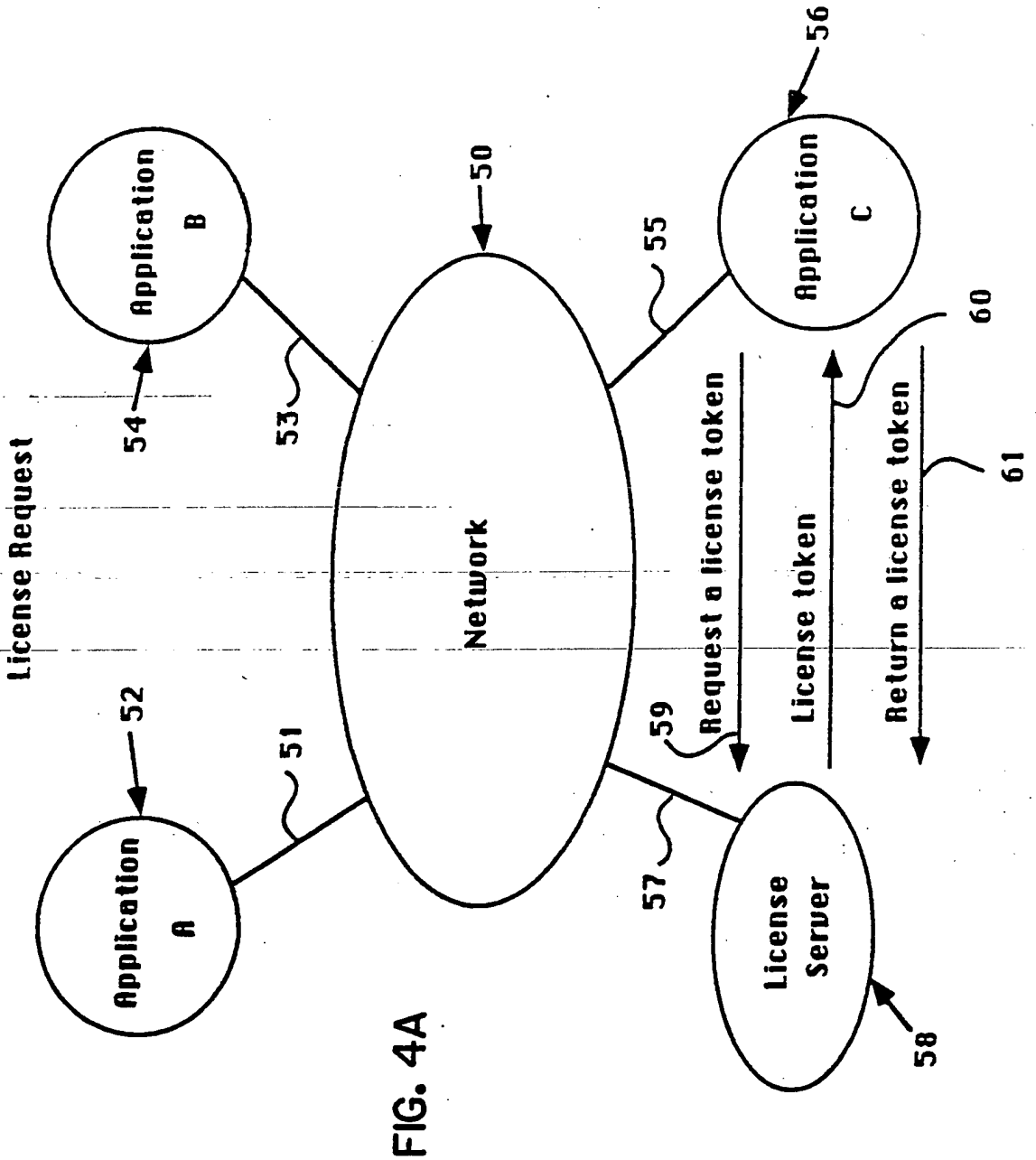
Application A
Application B
Application C
Network
License Server
License Request
Request a license token
License token
Return a license token
50
51
52
53
54
55
56
57
58
59
60
61

FIG. 4A

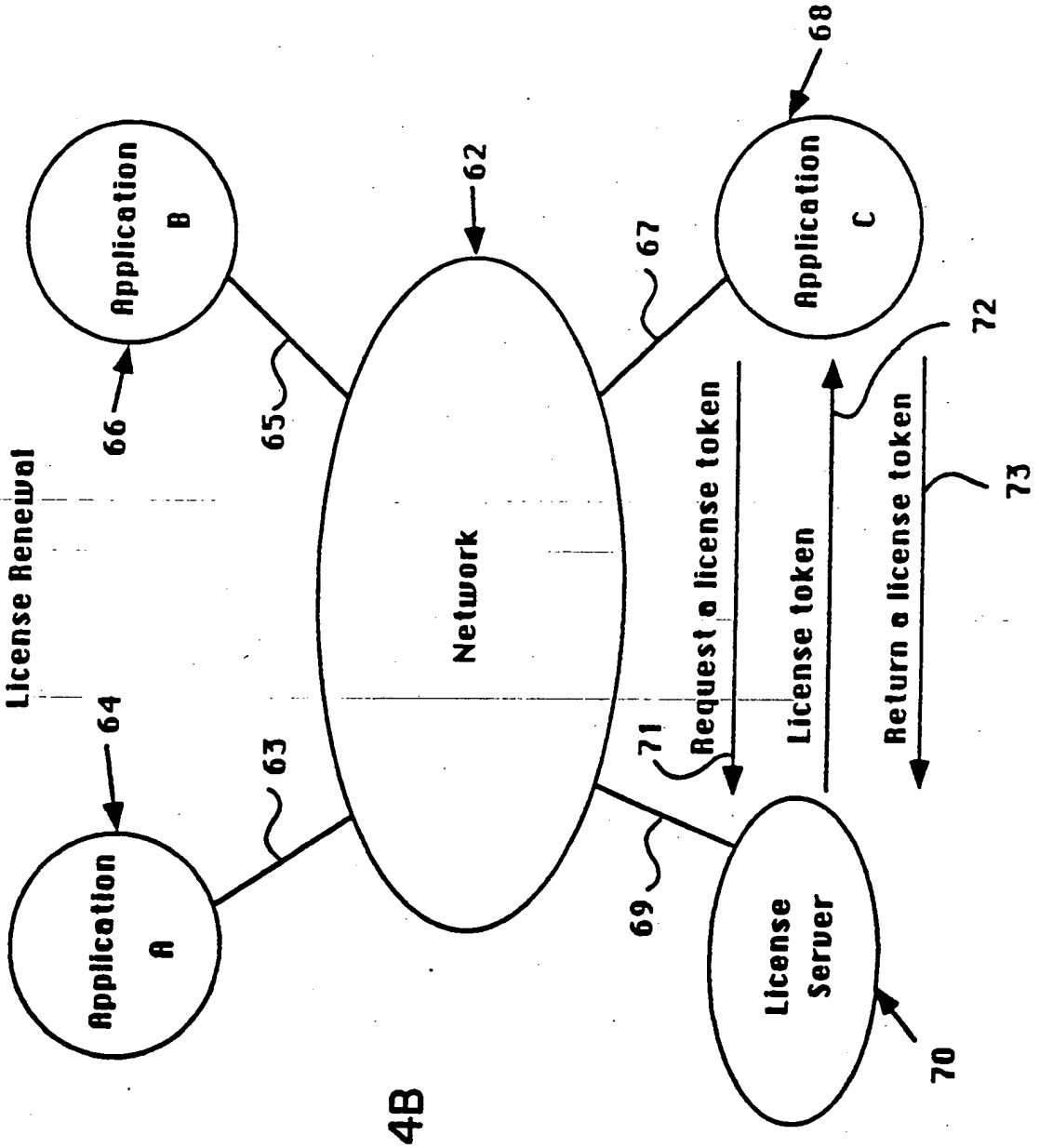
Application B
66
65
62
67
68
Application C
License Renewal
Network
72
Request a license token
71
License token
Return a license token
73
64
63
69
Application A
License Server
70

FIG. 4B

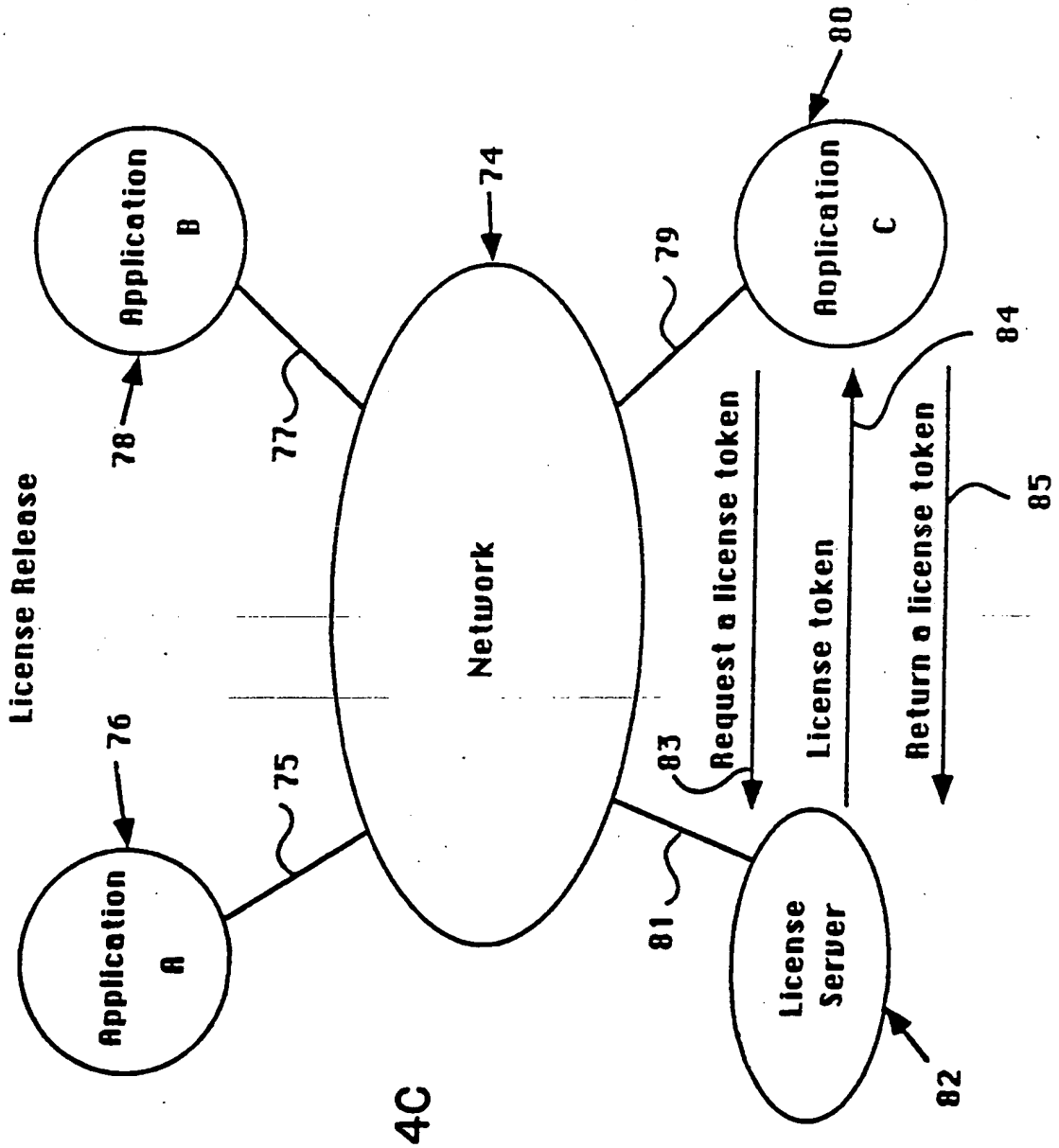
Application B
78
77
74
79
Application C
80
License Release
Network
Request a license token
83
License token
84
Return a license token
85
76
75
Application A
81
License Server
82

FIG. 4C

METHOD FOR PROTECTING AGAINST THE UNAUTHORIZED USE OF SOFTWARE IN A COMPUTER NETWORK ENVIRONMENT

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to a method for protecting against the unauthorized use of a software application in a computer network environment.

2. ART BACKGROUND

A computer network is typically an interconnection of machines or agents over links or cables. The open access characteristics of a computer network presents opportunities for the unauthorized copying of software, thus eroding the licensing revenue potential of software developers. Traditionally, either the entire network must be licensed (commonly referred to as a site license), or each node where the software is run must be licensed (commonly referred to as a node license). A node refers to a single machine, agent or system in a computer network. A license is an authorization given by a software developer to a customer to use a software application in a specific manner.

A site license lets all users at a designated location or network use the software application, regardless of their position on the network. This flat-fee approach is an overkill for a low usage software application. A node license not only ties a software application to a particular machine in a network, but also is not cost effective for the infrequent use of a software application. See, for example, U.S. Patent No. 4,688,169. Furthermore, if new users of licensed nodes wish to use the software application, they are often required to purchase additional licenses.

An alternative to a site license or a node license is the concept of a concurrent usage license. A concurrent usage license restricts the number of users allowed to use a software application at any given time, regardless of their location on the network. Just as renters check out available copies of a

movie video from a video rental store, users on a network check out a software application from an agent on a first-come-first-serve basis. Thus, a concurrent usage license charges a fee for the use of a software application proportional to its actual use.

Methods to license a software application for concurrent use in a network environment are currently offered by Highland Software, Inc. and Apollo Computer, Inc. See, M. Olson and P. Levine, "Concurrent Access Licensing", *Unix Review*, September 1988, Vol. 6, No. 9. In general, the license for a software application is stored in a database controlled by a license server. A license server is a program that not only stores the license, but also verifies the user's credentials before checking out the license to the authenticated user. To protect against the authorized use, these methods to license concurrent usage rely on secured communications such as public/private key encryption. Under public/private key encryption, each user of the system has two keys, one of which is generally known to the public, and the other which is private. The private transformation using the private key is related to the public one using the public key but the private key cannot be computationally determined from the public key. See Denning, D., *Cryptography and Data Security*, Addison-Wesley, 1982. The encryption key is hidden in the license server to encrypt the database of licenses. Well designed public/private key encryption schemes are difficult to crack, especially if the license server is located in a trusted environment. A trusted environment is one whose access is limited to users having the proper credentials. However, a license server is more likely to be located at a customer's site and hence in an hostile environment. It follows that the license server is vulnerable to sophisticated intruders. Once the private key is decrypted, all sensitive information on the license server such as licenses are compromised.

It is therefore an object of the present invention to provide a more secure method to protect against the unauthorized use of software in a concurrent use licensing environment.

SUMMARY OF THE INVENTION

The present invention provides to the software application the verification and license check out functions which are normally performed by a license server. The preferred embodiment of the present invention comprises a computer network including a plurality of agents running at least one license server and at least one software application. The license server controls a database of an agent containing the license information for the software application. The license information is contained in a license token, and is stored in the database controlled by the license server. The license token is a special bit pattern or packet which is encrypted by the software vendor of the application software. The software application communicates with the license server through a licensing library. The licensing library is a collection of library routines that the software application invokes to request or renew a license from the license server. Before a software application obtains a license, the license token must be decoded by a license access module. The license access module, which is linked with the software application and the licensing library is a program that decodes the license token from a vendor specific format to a licensing library format.

When an user wishes to run a software application, the licensing library invokes a call to request a license token from the license server. In contrast to the prior art where the license server either grants or denies the request after verifying the user's credentials, the license server in the preferred embodiment of the present invention finds the correct license token for the software application and transmits the license token to the licensing library. The license access module attached to the licensing library decodes the licensing token. Routines in the licensing library coupled to the software application verify the license information before checking out the license and updating the license token. The license access module encodes the updated license token before returning it to the license server.

Because the verification and check out function of a license token are performed by a software application, the software application rather than the license server becomes the point of attack by unauthorized users. Reverse engineering the license access module is less rewarding than attacking the license server because the license access module reveals the contents of a fraction of a database of licenses. By the time most attackers crack the license access module, the software vendors would most likely introduce newer versions of the software application and new license access modules for them. Thus the present invention provides a more secure method for protecting against the unauthorized use of a software application in a computer network environment without modifying the underlying computer network.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a network environment employing the present invention.

Figure 2 describes the architecture of a network licensing scheme employing the preferred embodiment of the present invention.

Figure 3 describes the installation of a license token in the preferred embodiment of the present invention.

Figure 4a illustrates the use of a license token to request a license from a license server in the preferred embodiment of the present invention.

Figure 4b illustrates the use of a license token to renew a license from a license server in the preferred embodiment of the present invention.

Figure 4c illustrates the use of a license token to release a license from a license server in the preferred embodiment of the present invention.

NOTATION AND NOMENCLATURE

The detailed description that follows is presented largely in terms of algorithms and symbolic representations of operations on data bits and data structures within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art.

An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. These steps are those requiring physical manipulation of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It proves convenient at times, principally for reasons of common usage, to refer to these signals as bit patterns, values, elements, symbols, characters, data packages, or the like. It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities.

Further, the manipulations performed are often referred to in terms, such as adding or comparing, that are commonly associated with mental operations performed by a human operator. No such capability of a human operator is necessary, or desirable in most cases, in any of the operations described herein that form part of the present invention; the operations are machine operations. Useful machines for performing the operations of the present invention include general purpose digital computers or other similar devices. In all cases there should be borne in mind the distinction between the method of operations in operating a computer and the method of computation itself. The present invention relates to method steps for operating a computer in processing electrical or other (e.g. mechanical, chemical) physical signals to generate other desired physical signals.

The present invention also relates to an apparatus for performing these operations. This apparatus may be specially constructed for the required purposes, or it may comprise a general purpose computer as selectively activated or reconfigured by a computer program stored in the computer. The algorithms presented herein are not inherently related to any particular computer or other apparatus. In particular, various general purpose machines may be used with programs written in accordance with the teachings herein, or it may prove more convenient to construct a more specialized apparatus to perform the required method steps. The required structure for a variety of these machines will appear from the description given below.

DETAILED DESCRIPTION OF THE INVENTION

The following detailed description is divided into several sections. The first of these sections describes a general network environment for accessing a database of licensed software programs. Subsequent sections discuss the details of a method for protecting against the unauthorized use of a software application.

I. General Network Environment

Referring to **Figure 1**, computer network environment comprises a plurality of data processing devices identified generally by numerals **10** through 10^n (illustrated as **10**, **10'** and 10^n). These data processing devices may include terminals, personal computers, workstations, minicomputer, mainframes and even supercomputers. For the purposes of this Specification, all data processing devices which are coupled to the present invention's network are collectively referred to as "agents". It should be understood that the agents may be manufactured by different vendors and may also use different operating systems such as MS-DOS, UNIX, OS/2, MAC OS and others. Particular examples of suitable agents include machines manufactured by Sun Microsystems, Inc., Mountain View, Calif. Each of the agents has an input device such as a keyboard **11**, **11'** and 11^n or a mouse **12**, **12'** and 12^n. As shown, agents **10** through 10^n (illustrated as **10**, **10'** and 10^n) are interconnected for data transfer to one another by a common cable **13**. It will be appreciated by one skilled in the art that the common cable **13** may comprise any shared media, such as coaxial cable, fiber optics, radio channel and the like. Furthermore, the network resulting from the interconnection of the cable **13** and agents **10** through 10^n (illustrated as **10**, **10'** and 10^n) may assume a variety of topologies, such as ring, star, bus, and may also include a collection of smaller networks linked by gateways or bridges.

Referring again to Figure 1 is a license service 14. The license service 14 is a resource shared by every agent connected to the network. In the preferred embodiment of the present invention, the license service 14 comprises license servers 15 through 15^m (illustrated as 15, 15' and 15^m) and databases 17 through 17^m (illustrated as 17, 17' and 17^m), where m is less than or equal to n. A license server is a program that runs on an agent with a memory storage capability. Each license server 15 (illustrated as 15, 15' and 15^m) communicates with a database 17 stored in memory on the agent over an interface 16 (illustrated as 16, 16' and 16^m). As will be described in detail below, the database 17 stores licensing information for various software applications which are purchased and authorized to run in the computer network environment. The license server is not limited to run on a specific agent, but can operate on any agent including the agent on which the user is to operate the application. Thus, any agent connected to the network may function as a license server as well as a device on which a user may operate application software. As will be described below, the license server does not perform verification of licenses of application software; rather the license server is passive and provides storing, locking, logging, and crash recovering function for the application software.

Figure 2 illustrates the architecture of a network licensing scheme of the present invention. The architecture comprises a database 18, database interface 19, license server 20, licensing library 24, License access module 27, license administration tool 21, license service binder 29, and license production tool 34.

The database 18 stores licensing information and application usage data. Preferably the database 18 comprises a plurality of records which contain the following information:

Database Element	Description
Unique Key Table	Keys for all other tables
Vendor Table	Vendor's ID and name
Product Table	Product number and name
Version Table	Version number and date
License Table	License #, exp date, total units
License Token Table	Stores encoded license token
Unit Group Table	A group's allocation of license
Group List Table	Name of the group
Allowed Users Table	Credentials of allowed users
Current License Use Table	Applications using a license
Lock Table	Locked records in database
Authorized administrator Table	Login names of administrators
License Operation Log Table	Administrator's log information
License Usage Log Table	Request handle plus Client Log
License Queue Log Table	License wait queue
Application Message Log Table	Application specific messages

A database interface 19 provides communication between the license server 20 and the database 18 in order to prevent concurrent access to the same database record by multiple users which can cause the data in the record to become corrupted. Thus, only the owner of the lock can read from and write to the locked record during the usage of the application.

The license server 20 operates on an agent and interfaces the database 18 to license administration tool 21, licensing library 24 and license service binder 29. The license server 20 communicates with the license administration tool 21, licensing library 24 and license service binder 29 via an interface 23. Preferably the interface 23 is a remote procedure call

mechanism which permits a process operating on one device or agent connected to the network to request a resource or service from a remote device or agent connected to the network. See A. Birrell and B. Nelson, "Implementing Remote Procedure Calls," *ACM Transaction on Computer Systems*, February 1984, Vol. 2, No. 1.

Multiple license servers may reside on multiple agents. Preferably the license server 20 operates in a background mode of the agent such that its operation is transparent to a user of that agent. More particularly, as will be described below, the license server 20 provides the following functions: 1) servicing the requests from the licensing library 24 for license token; (2) maintaining a wait queue for requests to the database 18 when no licensing units are available; (3) generating `locks` for exclusive access to database 18; and (4) providing access to information in the database 18.

The licensing library 24 is a set of library routines which enable the application 26 to request licensing service from the license server 20. Upon receiving the request for service from the licensing library 24, the license server 20 retrieves a license token from the database 18 and transmits it to the licensing library 24. The licensing library 24 is linked with the application 26 and communicates with the license server 20 over a path 28 with, preferably, a remote procedure call mechanism 23. Among the major library calls in the licensing library 24 is the application's request for a license from the license server 20. Other important library calls include the request to renew and to release a license. The use of the license token to accomplish the request for the various licensing service will be described in detail below.

The license access module (LAM) 27 is prepared by the software vendor 24 to decode the license token. Once decoded, the application 26 via routines in the licensing library verifies the licensing information in the license token and determines whether a license may be checked out. The LAM 27

also encodes the license token before the application returns it to the database 18 via license server 20. The license access module 27 is described in further detail below.

The license administration tool 21 is utilized by the network administrator to perform administrative functions relevant to the concurrent usage of a software application. The license administration tool 21 may run on any agent connected to the computer network. The license administration tool 21 is primarily used to install the license token into the database 18 through the license server 20. The functionality of the license administration tool 21 includes: (1) starting or terminating a license server, (2) accessing a database controlled by a license server; and (3) generating and printing reports on license usage.

The application 26 may not access the database 18 directly; rather, the request for a license is made through the licensing library 24 to the license server 20 over a path 28. Most network licensing schemes employ secured communication between the licensing library 24 and the license server 20. In contrast, the present invention uses the license access module (LAM) 27 the license library 24 and a plurality of license tokens to protect against the unauthorized use of software application in a computer network.

Referring once again to Figure 2, a license service binder 29 is shown coupled to the license server 20 over a path 30. The license service binder 29 is invoked by means known in the art, such as a network service program. The license service binder 29 locates all agents that are designated as servers on the network, and keeps track of which server is servicing which application. The license service binder 29 contacts each server on its table of available servers and requests a list of products it serves. Finally the license service binder 29 writes the contents of the table of available license servers and the list of products into a binding file 32 over a path 31. In Figure 2, the binding file 32 is coupled to the licensing library 24 over a path 33. The application 26

queries the binding file 32 to see which license server can service its request for a license.

A license production tool 34 is used by the software vendor to create a license token for transmittal to the network administrator. Receiving the license token, the network administrator installs it with the license administration tool 21 into the database 18 through license server 20.

II. License Token

Referring to Figure 3, the creation of a licensé token in a computer network employing the preferred embodiment of the present invention will be described. A computer network 38 is shown coupled with a license administration tool 39 and a single license server 44. The license server 44 communicates with a database 45. Applications 41, 42, and 43 are shown requesting licensing service from the license server 44. When a customer purchases a license for an application, such as a CAD/CAM program for its research and development department, the software vendor creates a license token with a license production tool, and delivers the license token to the customer's network administrator. A license token is a special bit pattern or packet representing a license to use a software application. The network administrator installs the license token 46 into the database of the license server using the license administration tool 39. Unlike the token used in a token ring which is passed from agent to agent, a license token in the preferred embodiment of the present invention is passed only between a license server and a licensing library for a predetermined amount of time. The predetermined amount of time corresponds to the time the license token is checked out of the license server. Currently, the license token is checked out to an application for no more than ten seconds, and the license token is returned as quickly as possible to the issuing license server. The license token 46 contains information encrypted in the vendor's format such as ,vendor identification, product and version numbers as well as the number of license units purchased

for the license token. A license unit corresponds to the license weighting for an agent connected to the computer network. For example, powerful workstations could require more license units to use a software application than an average personal computer.

The software vendor produces a license token using a license production tool 40. A path 47 illustrates how a license token 46' makes its way to a license administration tool 39 at the customer's site. There, the system administrator installs the license token 46' as license token 46 into the license database 45 of the license server 44. A path 48 indicates the transfer of the license token 46' from the license administration tool 39 to the license server 44 and into the database 45 as license token 46. The license server 44 is now ready to entertain requests from applications 41, 42, and 43 for a license to use the application corresponding to token 46 as well as other applications represented in its database 45.

It should be understood that each network may have a plurality of license servers and each license server may have in its database a plurality of license tokens for a variety of software applications. Referring again to Figure 3, if application A 41 requests and checks out the license token 46 for less than ten seconds, applications B and C 42, 43 would be unable to check out the license token 46 if their requests were made during the same time application 41 is checking out a license from the license token 46 because of the locking mechanism provided by database interface 19. Thus, to achieve concurrent license usage in network 38, it is preferred that the network administrator installs more than one license server. To minimize the task of recovering from license server crashes, it is also preferred that the system administrator spreads the license units for any one application among a plurality of strategically located license servers. For instance, if a network has four license servers, the network administrator may want to allocate the twenty license units for a particular popular application among four license tokens with

five license units for each license token. In the event one license server crashes or the license token is checked out, the other three license servers may provide licensing service to other applications.

Figure 4a illustrates the use of a license token to request for a license. As shown, a network 50 is provided, and is coupled to Applications 52, 54 and 56 respectively. Application 56 succeeded in requesting a license token from the license server 58 in step 59. The license token is transmitted to application 56 in step 60. When done, Application 56 returns the license token to the license server 58 in step 61. Aside from the license request function performed with the license token as shown in Figure 4a, the license token is also used in other critical stages of the licensing process. For example, an user may wish to run an application beyond the initial allocated time. As shown in Figure 4b, Application 68 makes a license renewal request 71 from the license server 70 with license token 72. Similarly, in Figure 4c the user makes a license release request 83 when the application no longer needs the license units. As such, the user updates the license token 84 by returning the updated license token to the license server 82 in step 85.

III. License Access Module

In Figure 2, a license access module (LAM) 27 is linked with the application 26 and the licensing library 24 to form the executable code that software vendors ship to the customers. The license access module 27 decodes and encodes the encrypted license token as it is being passed between the license server and the licensing library 24. Thus the level of security of an application from unauthorized use depends heavily upon how secure the license access module is.

Conventional network licensing schemes use public/private key encryption to encode sensitive information. Such a scheme is effective if the license server is in a trusted environment. However, the customer has the

same access to any agent in a network, including the license server. The security of the licensing scheme can be compromised by a user who decrypts the license server's private key. Once the unauthorized user determines the server's private key, he can decrypt all sensitive information on the license server. Should all license servers use the same key, as is frequently done, then all the security of the applications served by all the license servers will be compromised.

The license access module 27 first translates a license token from a vendor specific format to a format usable by the licensing library 24. The license access module accomplishes the translation in two modules. One module translates or decodes a license token from a vendor specific format to a licensing library format. The second module translates or encodes the updated license token from the licensing library format to the vendor specific format. The second module is invoked anytime the licensing library updates the information in a license token.

Upon receiving the license token in the licensing library format, the licensing library invokes routines which verify the correctness of the license by reviewing the following license information stored in the token: (1) flag, (2) maintenance contract date, (3) host name and domain, (4) product name, (5) host id number, (6) license serial number, and (7) expiration date of license. This is compared to the information maintained by the application. If the information matches, the license is verified. After completing the verification process, a routine in the licensing library is initiated which checks out the license by decrementing the license units in license token by the number of licensing units being checked out.

The decoding and encoding routines allow software vendors to implement their own security mechanism to protect their licenses from unauthorized use even though they reside at the customer's sit .

Below is an example of a sample application using the licensing library and the license access module written in C language:

```
#define LIC_RENEWAL_TIME (60)            /set renewal time for this session/
#define EST_LIC_RENEWAL_TIME (LIC_RENEWAL_TIME x .9)

NL_vendor_id NL_Vendor_id = 1223;                    /set vendor #/
NL_prod_num NL_Prod_num = "02"                       /set product #/
NL_version NL_Version = ( 12/20/88, "1.0" );         /set version id #/

...
      status = NL_init (vendor_id, NULL, &job_id);  /initialize license service/
      if (status != NL_NO_ERROR)      /accept job id if no error/
            {
            fprintf (stderr, "nl_init failed - error =
            %d\n", status );                         /error message if error and
                                                     return/
            return;
            }
-------------------------------------------------------------------------------
      units = 3;
      code_funcs.encode_p = nl_encode;   /pointer to encode function/
      code_funcs.decode_p = nl_decode;   /pointer to decode function/
      if (signal (SIGALRM), alarm_intr ) == (void *) -1)      /set alarm if no
                                                              error/
            {
            perror ("Cannot set SIGALRM"); /otherwise, error message/
            return;
            }
      status = NL_request (job_id, NL_Prod_num,   /request a license/
      &NL_Version,
      units, LIC_RENEWAL_TIME, NL_L2_SRCH,
      &code_funcs, NULL,
      &req_handle, NULL, &app_info);

      if (status != NL_NO_ERROR)                 /no error, license checked
            {                                    out from license server/
            fprintf (stderr, "nl_request failed - error =
            %d\n", status);                      /otherwise, error message/
            return;
            }

      /*
       * We got a license                        /license request successful/
       */

      alarm (EST_LIC_RENEWAL_TIME);              /set alarm for license renewal
                                                  time/
...   Application Runs                           /runs application/
...
      status = NL_release (req_handle);          /request to release a license/
      if (status != NL_NO_ERROR)
            {
            fprintf (stderr, "nl_release failed - error =      /otherwise, error
```

```
                %d\n", status);                                messages/
              . return;
                }

    ...
5       int
        alarm_intr ()
                {

        status = NL_confirm (req_handle,        /renew licensing unit with
        LIC_RENEWAL_TIME, NULL);                 licensing server/
10      /*
         * Verify vendor private information
        */
                }

        If (status!= NL_NO_ERROR)
15      fprintf (stderr, "nl_confirm failed - error =       /otherwise, error
        %\n", status);                                      message/
                {
                        puts ("license renewed")            /successful license
                }                                           renewal/

20
```

The sample application given above is accompanied by self-explanatory annotation to the right margin of the codes. Of particular interest are code_func.encode_p and code_func.decode_p. Encode_p and decode_p are pointers to the software vendor's encode and decode routines, respectively. Taking the pointers in the code_func variable, the licensing library can use the pointers to invoke the decoding and encoding routines in the license access module. The three major licensing library routines, request for a license (NL_request), release a license (NL_release) and renew a license (NL_confirm) invoke the decoding and encoding routines. For example of a license access module, see Appendix 1.

In implementing the license access module, the license server becomes merely a repository for license tokens. The licensing library coupled to the application performs the procedure of authenticating the license token prior to granting a license and therefore access to run the application.

Because the level of security of the system is dictated by the license access module, the software vendors are free to make the license access module as simple or as complex as they desire. In particular, they are free to

adopt any of the encryption schemes as part of their encryption routines. If the security mechanism is broken, and the encryption known to others, then the software vendors can easily remedy the situation by releasing a new version of the product with a new license access module.

While the present invention has been particularly described with reference to Figures 1-4 as well as Appendix 1, and with emphasis on certain language in implementing a method to protect against the unauthorized use of software application in a computer network environment, it should be understood that they are for illustration only and should not be taken as limitation upon the invention. In addition, it is clear that the method of the present invention has utility in any application run in a computer network environment. It is contemplated that many changes and modifications may be made, by one skilled in the art, without departing from the spirit and scope of the invention disclosed above.

CLAIMS

1. In a computer network environment including a plurality of software applications licensed to run on at least one network of agents, said applications located on said agents wherein use of the application on a particular agent is permitted upon the grant of a license, said license being requested by a user from said agent of said applications, a system for protecting against the unauthorized use of said applications comprising:

license token means for storing licensing information of said applications; license server means connected to said agents for communicating with said applications, said license server means having a database which stores said license token means, said license server means further retrieving said license token means from said database upon a request for a license by said applications, said license server means further transmitting said license token means to said applications;

license access means connected to said agents for decoding and encoding said license token means from said license server means, said license access means being integrated with said applications, said license access means receiving said license token means from said license server means; and

licensing library means connected to said agents for verifying said decoded license token means before access to said license is granted, said licensing library means being integrated with said applications.

2. The system as defined in claim 1, wherein each said license token means containing licensing information for at least ne versi n of each said applications.

3. The system as defined in claim 1, wherein the contents of said license token means is encrypted.

4. The system as defined in claim 1, wherein said license token means is passed between said license server means and said licensing library means for a predetermined time period.

5. The license token means as defined in claim 4, wherein during said predetermined time period, only one said applications may check out one said license token means.

6. The system as defined in claim 1, wherein said license server means receives said request for a license from said applications, said license server searches in said database for a license token means storing the license requested by said application before retrieving said license token means.

7. The system as defined in claim 1, wherein said license access means decodes the contents of said license token means before said licensing library means verifies said license token means.

8. The system as defined in claim 1, wherein said license access means encodes said license token means after said licensing library verifies said license token means and prior to returning said license token means to said license server means.

9. The system as defined in claim 1, wherein said licensing library verifies said license token means by

comparing the licensing information stored in said license token means with the licensing information maintained by said application.

10. The system as defined in claim 1, wherein said licensing library means checks out said license of said application in response to a positive comparison of the license information.

11. The licensing library means as defined in claim 10, wherein said license for said application being checked out after said licensing library verifies said license token means.

12. In a computer network environment including a plurality of software applications licensed to run on at least one network of agents, said applications located on said agents wherein use of the application on a particular agent is permitted upon the grant of a license, said license being requested by a user from said agent of said applications, a system for protecting against the unauthorized use of said applications comprising:

license token means for storing licensing information of said applications;

license server means connected to said agents for communicating with said applications, said license server means having a database which stores said license token means, said license server means further retrieving said license token means from said database upon a request for a license by said applications, said license server means further transmitting said license token means to said applications;

license access means connected to said application and accessible from said agents for decoding and encoding said license token means from said license server means, said license access means being integrated with said applications;

licensing library means connected to said application and accessible from said agents for verifying said decoded license token means before access to said license is granted, said licensing library means being integrated with said applications; and

license binding means connected to said license server means and to said licensing library means for constructing a binding file, said binding file informing said licensing library means which of said license server means may grant a license to said application.

13. The system as defined in claim 12, wherein said licensing library means are located on the same agents as said applications.

14. The system as defined in claim 12, wherein said license sever means are located on the same agents as said licensing library means.

15. The system as defined in claim 12, wherein each said license token means contains licensing information for at least one version of each of said applications.

16. The system as defined in claim 12, wherein the contents of said license means is encrypted.

17. The system as defined in claim 12, wherein said license token means is passed between said license server

means and said licensing library means for a predetermined time period.

18. The license token means as defined in claim 17, wherein, during said predetermined time period, only one of said applications may check out one said license token means.

19. The system as defined in claim 12, wherein said license server means further transmit said license token means to said licensing library means.

20. The system as defined in claim 12, wherein said license access means decodes the contents of said license token means before said licensing library means verifies said license token means.

21. The system as defined in claim 12, wherein said license access means encodes said license token means after said licensing library verifies said license token means and prior to returning said license token means to said license server means.

22. The system as defined in claim 12, wherein said license binding means constructs said binding file by contracting each said license server means to request for a list of applications it serves, said binding file containing said list of applications available from said license server means.

23. In a computer network environment including a plurality of software applications licensed to run on at least one network of agents, said applications located on

said agents wherein use of the application on a particular agent is permitted upon the grant of a license, said license being requested by a user from said agent of said applications, a system for protecting against the unauthorized use of said applications substantially as hereinbefore described with reference to the accompanying drawings.

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